

AMENDMENT TO THE CLAIMS

1. (currently amended): A head for use with a moving magnetic medium, the head comprising:

a perpendicular writing element including a main pole having a main pole tip, a return pole connected to the main pole at a back gap and having a return pole tip located downstream of the main pole relative to the moving magnetic medium, a write gap between the main and return poles, and a conductive coil adjacent the main and return poles, wherein an area of a magnetic medium facing surface of the main pole tip is less than an area of a magnetic medium facing surface of the return pole tip; and

a ~~perpendicular~~ reading element positioned upstream of the perpendicular writing element relative to the moving magnetic medium and including a top shield, a bottom shield upstream of the top shield, and a read sensor positioned between the top and bottom shields.

2. (original): The head of claim 1, wherein the main and return poles are formed of a magnetically permeable material selected from a group consisting of CoZr, CoZrNb, Ni₄₅Fe₅₅, FeN, FeAlN, cobalt-iron (CoFe), cobalt-nickel-iron (CoNiFe), nickel-iron (NiFe), and iron (Fe).

3. (previously presented): The head of claim 1 including a non-magnetic layer separating the top shield from the writing main pole.

4. (original): The head of claim 3, wherein the non-magnetic layer is formed of silicon oxide (SiO₂), silicon nitride (Si₃N₄), aluminum oxide (Al₂O₃), or tantalum oxide (Ta₂O₅)

5. (original): The head of claim 1, wherein the non-magnetic layer is formed of a conductive layer sandwiched between insulating layers.

6. (original): The head of claim 5, wherein the conductive layer is copper (Cu), aluminum (Al), tantalum (Ta), or tungsten (W), and the insulating layers are aluminum oxide (Al_2O_3), silicon oxide (SiO_2), tantalum oxide (Ta_2O_5) or silicon nitride (Si_3N_4).

7. (original): The head of claim 1, wherein a thickness of the non-magnetic layer is approximately 1 micrometer or greater.

8. (original): The head of claim 1, wherein the gap layer defines a write gap of approximately 1 micrometer or less.

9. (original): A disc drive storage system including the read/write head of claim 1.

10. (currently amended): A head for use with a moving magnetic medium, the head comprising: a perpendicular writing element including a main pole having a main pole tip, a return pole connected to the main pole at a back gap and having a return pole tip located downstream of the main pole relative to the moving magnetic medium, a write gap between the main and return poles, and a conductive coil adjacent the main and return poles, wherein an area of a magnetic medium facing surface of the main pole tip is less than an area of a magnetic medium facing surface of the return pole tip, and

~~a perpendicular reading element positioned downstream of the perpendicular writing element relative to the moving magnetic medium and including a top shield, and a read~~

~~sensor positioned between the top shield and the return pole.~~

11. (original): The head of claim 10, wherein the main and return poles are formed of a magnetically permeable material selected from a group consisting of CoZr, CoCzNb, Ni₄₅Fe₅₅, FeN, FeAlN, cobalt-iron (CoFe), cobalt-nickel-iron (CoNiFe), nickel-iron (NiFe), and iron (Fe).

12. (original): The head of claim 10, wherein the write gap is approximately 1 micrometer or less.

13. (original): A disc drive storage system including the head of claim 10.

14. (previously presented): A head for recording perpendicularly oriented magnetic patterns to a moving magnetic medium, the head comprising main and return poles separated by a write gap, the main pole positioned upstream of the return pole relative to the moving magnetic medium, wherein the main pole includes a writing edge adjacent the write gap for defining transitions between adjoining magnetic patterns recorded to the magnetic medium.

15. (previously presented): The head of claim 14, wherein the main pole includes a main pole tip having a magnetic medium facing surface whose area is less than an area of a magnetic medium facing surface of a return pole tip of the return pole, the head includes:

a conductive coil adjacent the main and return poles adapted to induce magnetic flux therein;

a perpendicular reading element upstream of the main pole relative to the moving magnetic medium and including a top shield, a bottom shield upstream of the top shield

relative to the moving magnetic medium, and a read sensor positioned between the top and bottom shields; and

a non-magnetic layer separating the top shield from the main pole.

16. (original): The head of claim 15, wherein a thickness of the non-magnetic layer is approximately 1 micrometer or greater.

17. (original): The head of claim 15, wherein the non-magnetic layer is formed of a conductive layer sandwiched between insulating layers.

18. (original): The head of claim 17, wherein the conductive layer is copper (Cu), aluminum (Al), tantalum (Ta), or tungsten (W), and the insulating layers are aluminum oxide (Al_2O_3), silicon oxide (SiO_2), tantalum oxide (Ta_2O_5) or silicon nitride (Si_3N_4).

19. (previously presented): The head of claim 14, wherein the main pole includes a main pole tip having a magnetic medium facing surface whose area is less than an area of a magnetic medium facing surface of a return pole tip of the return pole, the head includes:

a conductive coil adjacent the main and return poles and adapted to induce magnetic flux therein; and

a perpendicular reading element positioned downstream of the return pole relative to the moving magnetic medium and including a top shield, and a read sensor positioned between the top shield and the return pole.

20. (currently amended): A head for use with a moving magnetic medium, the head including a perpendicular writing element comprising:

a main pole having a main pole tip, the main pole configured to record magnetic patterns to the moving magnetic medium that are oriented substantially perpendicular to the main pole tip; and

a return pole having return pole tip located downstream of the main pole relative to the moving magnetic medium; and-

a write gap between the main and return pole tips.

21. (currently amended): The head of claim 20, wherein: ~~the main pole includes a main pole tip; and the return pole includes a return pole tip having~~ a magnetic medium facing surface of the return pole tip has an~~whose~~ area that is greater than an area of a magnetic medium facing surface of the main pole tip.

22. (previously presented): The head of claim 20 including a reading element positioned downstream of the writing element relative to the moving magnetic medium.

23. (previously presented): The head of claim 20 including a reading element positioned upstream of the writing element relative to the moving magnetic medium.

24. (previously presented): The head of claim 20, wherein the magnetic medium is formed on a disc.

25. (new): The head of claim 10 including a reading element positioned downstream of the perpendicular writing element relative to the moving magnetic medium and including a top shield, and a read sensor positioned between the top shield and

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the return pole.